Spring 1990

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NSU Oceanographic Center

Nova University Oceanographic Center

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PROJECTS ABOUND IN BIOLOGICAL LABORATORY

Marine Biologist **Dr. Gary Kleppel** is the Center's most recent addition to the faculty. He joined us in 1987 from the University of Southern California, where he was a Research Scientist. Since the time, Dr. Kleppel has rapidly become an integral part of the Oceanographic Center's research and academic programs.

The focus of Dr. Kleppel's work is on the marine food web. His work area, called "the Biological Laboratory, " is well equipped with trace analytical HPLC capabilities as well as fluorometric, microscopic, and controlled culturing facilities. Four students (1 Ph.D. candidate and 3 M.S. students) are working closely with him. Collaborative ties to electron microscopy are maintained with Center micropaleontologist **Dr. Pat Blackwelder.**

Current and recent research projects include (1) measurement of growth and photosynthesis by microscopic algae, or phytoplankton, that drive the ocean's food chain; (2) determination of the natural diets of zooplankton and of the relationships between feeding and production in marine animals; (3) studies of coral symbiosis and the short-term effects of environmental stress on coral physiology; (4) studies of the relationships between physical and biological processes in the sea; and (5) development of traces of sewage in estuarine and marine environments.

Projects that will be spinning up over the next 12 months include a study of the Gulf Stream front and the coupling of the physical environment and biology of the area. This study will involve biological oceanographers, physical oceanographers, and fishery biologists from Nova and the University of Miami. A complementary program incorporating physical oceanographers from Harbor Branch Institution is in the planning stage.

Dr. Gary Kleppel in the Biological Laboratory

Dr. Kleppel is an active member of the Center/Port Everglades team. His main responsibility has been to draft a Strategic Environmental Plan for consideration by the Port Everglades Authority (P.E.A). This effort is basically a plan to plan, and will be provided to the Port under the terms of the Center's environmental services agreement with the P.E.A.

Dr. Kleppel also has been active in the Center's Master's program. His courses in the Marine Biology Speciality have included Marine Zooplankton, Biological Indicator Organisms, and Dynamical Biological Oceanography. An innovative approach is the requirement that all students produce a research proposal. Laboratory exercises further involve students in the nitty-gritty of research.

During the past three years, Dr. Kleppel and his students have worked in a wide variety of locations, which include the Irish Sea, the Indian and Eastern Pacific Oceans, the Gulf Stream, the Bahamas, and many areas of the North Atlantic Ocean. Joint research has been conducted with scientists at the University of Southern California, University of Washington, University of Georgia, University of Miami, Tracor Applied Sciences, NOAA's Atlantic Oceanographic and Meteorological Laboratory in Miami, and the Port Erin Marine Lab (Isle of Man).

A considerable amount of time has been spent working in local waters. Dr. Kleppel and his students keep a time series record of temperature and salinity in Port Everglades in order to understand the local hydrography. They also have assisted Broward County in the monitoring of local coral reefs. Over the next year, Dr. Kleppel will be developing research programs focused on recreational fisheries that will interface with some of the needs of the industry.

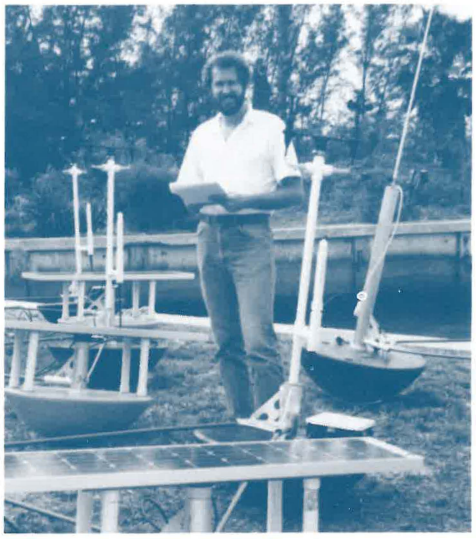
Funding comes from primarily extramural sources, including the National Science Foundation, Office of Naval Research, NOAA's Office of Sea Grant, Broward Couty, and the P.E.A. Dr. Kleppel's students have benefited from private support by the Karlen Conservation Fund and the Academy of Marine Sciences as well as from the Naval Surface Warfare Center.

SNYDER FIELD EXPERIMENT PROGRESSING ON SCHEDULE

On March 20, **Dr. Russell Snyder**, **Dr. Wayne Neu**, from the University of Rhode Island, technicians **Ted Tankard** and **Terry Thompson**, M.S. student **David Stout**, and a host of other graduate students departed for Basin Harbour Cay in the Bahamas to carry out a wave study. Dr. Snyder set sail on his ketch, *Catspaw*. He was supported by the University of Miami's R/V *Calanus,* which helped with the transport of personnel and equipment to the island base.

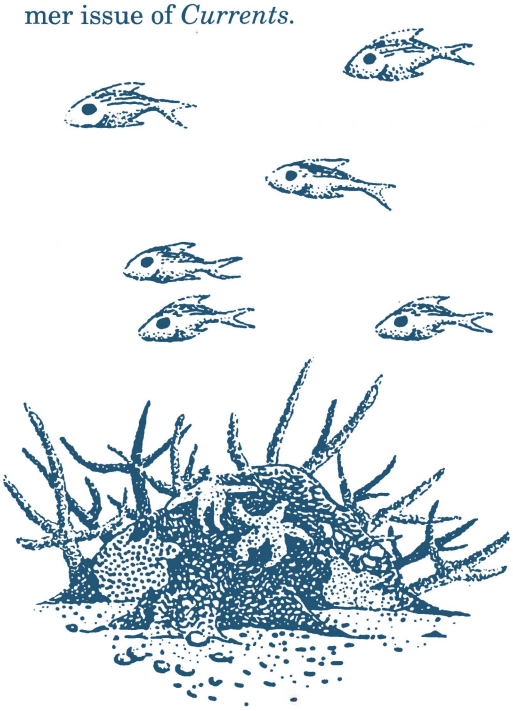
This is the third major field experiment at this site in as many years for Dr. Snyder (see *Currents,* Summer 1988 and Spring 1989). Funded by the National Science Foundation, the study focuses on the design and deployment of a wave array, which provides wave, wind, and current data from 10 different sites to a receiving tower by means of telemetry.

Jody Snyder, Dr. Snyder's wife, has been in frequent radio and telephone contact with the group and reports good progress at the experiment site. All 10 stations are now performing satisfactorily as they send data back to the tower at Basin Harbour Cay 24 hours a day. The anchored arrays are distributed over a 50 x 150 km region in the northern half of a shallow bay. This logistical setup means that the scientists and students spend much of their time running the 2 Carolina Skiffs back and forth between the base and the arrays, checking the electronics, making adjustments, keeping the experiment on track.



Dr. Wayne Neu with arrays prior to cruise

A constant stream of scientists and Nova students has been shuttling back and forth to the Bahamas with food supplies (meat! potatoes! veggies!) and various pieces of equipment since the beginning of the experiment. Several co-workers have visited from The Netherlands, Canada, and NOAA/AOML in Miami; Nova graduate students helped with the initial setup as well as the dismantling process at the end of May. The progress of the experiment will be covered in greater detail in the Summer issue of *Currents.*



In Memoriam

It is with deep regret that we report the death of **Capt. Peter Throckmorton,** adjunct professor of marine archaeology. He passed away suddenly on June 5, at his home in Maine.

More New Friends Sought

We have been mildly successful in attracting new **Friends of the Oceanographic Center.** However, we do need more members and wider sponsorship of our research activities.

As proponents of Earth Day have pointed out this spring, our planet is suffering. Through expanded basic research projects in oceanography, perhaps we can help to reverse the trend. But oceanographic research is very expensive, and the funding agencies on which we rely for support have barely kept up with inflation. Meanwhile, competition for funding dollars gets stiffer and expansion becomes wishful thinking. It is for these reasons that we are renewing our plea for more public support of our research efforts.

We need microscopes, lab equipment, boat fixtures, scholarships, and, most of all, we need a *building* to house new labs and offices. In other words, we need *you!*

So won't you please send us your tax-deductible contribution so that we can count on you as a **Friend?** In return, we will send you a certificate, a small gift, publications, announcements, and invitations to receptions and celebrations held at the Center. Please make your check payable to Nova University and mark it "Friends of the Oceanographic Center." Use the return address shown on the front of this newsletter.

Fund Application:

___ Scholarship ___ Building
___ Lab Facilities ___ General

Categories

___	Student/Individual	($25)
___	Contributor/Family	($50)
___	Associate	($100+)
___	Sponsor	($500+)
___	Benefactor	($1000)
___	Development Board	($2,500+)

New Member _____ Renewal _____

Name _____

Address _____

_____

Phone _____

Center Forms Board of Governors

Dr. Julian McCreary, Director, has announced the formation of a Board of Governors for the Oceanographic Center. Through the efforts of **Mr. Louis (Bud) Huch**, of Nova's Development Office, and **Dr. Richard Dodge**, this difficult task finally has been accomplished. It has been several years since such a group has been active at the Center. According to Dr. Dodge, "an initial organizational meeting is being planned. The Board of Governors is expected to become a key player in the Center's long- and short-term growth plans." The Board nominees are:

Betty Blaisdell Berry: Dir., Maritime, Archaeological & Historical Research Inst.

James Bleech: Pres., Yacht Center, Pompano Beach

Scott Boyd: Owner, Boyd Bait & Tackle; V.P., Guy Harvey, Inc.

Arthur "Bud" Brown: Ardell Yacht & Ship; V.P., Marine Advisory Bd.

Patricia Carr: Carr Communications

Russ Cheatham: Dist. Manager for SE Florida, Shell Oil Co.

Richard Donato: Attorney, England & Donato

Ted Drum: Pres., Drum Realty

Ham Fee: Pres., Lotspeich Co. of Florida

Ron Fitzgerald: Attorney, Fleming, O'Bryan & Fleming

Charles Forman: Board Chm. Emeritus

John C. Good: Pres., John C. Good Co., Advertising & Public Relations

John J. Grady, Jr.: Grady Marine Construction, Inc.

Michael Greep: V.P., Bank Atlantic of Ft. Lauderdale

Chris Jacoby: Jacoby, O'Connor & Mathews Advertising

Fred Lefebure: Pres., Cleveland Process Co.

Marshall B. Lytle II: Investment and Management Research

Jerry Pascoe: Pres., Pascoe Assoc., Marine & Cargo Surveyers

Joe Paskoski: Merrill Lynch & Co.

Jim Ramsey: J.C. Ramsey & Co., Marine Publications & Advertising

Stan Smoker: Developer, Ft. Lauderdale & The Bahamas

Don Spieker: Owner, Lighthouse Point Marina

Ron Stroud: Pres., International Marina Research & Management

Barbra Swanson: Marine Div., NCNB Bank of Florida

Anna Tallent: Marine Div., Barnett Bank

Herman Weist: Pres., Weist Industries

Richard Wilson: Pres., Navy League, Ft. Lauderdale Council

Dr. Julian McCreary and Dr. Richard Dodge with Ray print

Center Receives Welcome Donations

Dr. and Mrs. Charles Forman once again have donated an excellent work of art to the Center. We already have lined our walls with **Guy Harvey** prints and originals donated by the Formans. The newest acquisition is a **Don Ray** print of, appropriately, snook in a mangrove forest. It is a most welcome asset to the Coastal Studies area.

Robert W. Hall, of Fort Lauderdale, has donated a host of marine materials and equipment to the Center. Since we are in the midst of refurbishing our research vessel, the bits and pieces are most welcome at this point. Some of the materials are fuel pumps, a hot water tank, a generator and regulator, a bilge pump, diver weights, and assorted filters, fans, clamps, wrenches, hinges, hooks -- you name it! We are most grateful.

Population Studies Begun

Dr. Charles Messing currently is engrossed in examining specimens of organisms that were collected off Grand Cayman Island. He is looking at Foraminifera, Bryozoa, worm tubes, and other "critters" recovered from 8"x8" acrylic settlement panels that lay at the base of the deep reef wall in 150 m. of water for 2-1/2 years.

His preliminary study considers transition areas from densely populated reef environments at 100 m. depth, where living space for the organisms is at a premium, to sparsely populated environments at 200 m., where organisms apparently are not space-limited. Dr. Messing wants to know why. "Is it due to the decrease in food?" he asks. "In light? In temperature?" He knows that all of these factors play a role, but he is interested in the extent of their influence.

In Dr. Messing's proposed continuation project, he wants to conduct a more detailed analysis of the transition zone. He hopes to install arrays of panels at 20 m. intervals between 100 m. and 200 m. off the Caymans. He will use a submersible vehicle to recover the arrays at specific intervals over the next several years.

Dr. Charles Messing at the microscope

PEOPLE ON THE MOVE

Ph.D.candidate **Yasushi Fukamachi** visited his native land in April in order to attend the spring meeting of the Oceanographic Society of Japan, which took place during April 5-9 in Tokyo. He presented a talk entitled "A Numerical Investigation of Jets and Eddies near an Eastern Boundary." He also visited the Research Institute for Applied Mechanics at Kyushu University in Fukuoka for talks with **Prof. Toshio Yamagata.**

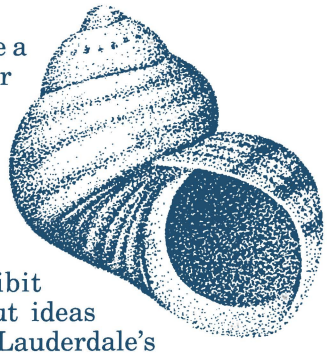
Dr. Gary Kleppel has returned from the Marine Institute of the University of Georgia, on Sapelo Island, where he spent most of the month of April as Visiting Scientist. He was working with **Drs. Evelyn Sherr** and **Barry Sherr** to document microbial links to metazoan food webs, and to develop initial data on copepod production and bioenergetics in one of the few natural salt marsh ecosystems in the Southeast.

M.S. students **Gayle Stone** and **Carol Burkart** also visited the University of Georgia lab during the latter part of April, in order to learn laboratory methods and to experiment with techniques that they plan to use in their theses. **Dr. Kleppel** is their major professor.

Capt. Peter Throckmorton, Center Adjunct, was honored at the 5th Annual Underwater Archaeological Symposium, which was held in Vancouver, B.C., April 29-30. Sponsored by the Underwater Archaeological Society of British Columbia, the symposium featured talks by several experts in the field. Capt. Throckmorton presented a talk entitled "Ghosts of Cape Horn - Shipwrecks of the Falklands," as well as an evening lecture entitled "Stormie Seas." He also gave a guided tour of the R.C.M.P. vessel *St. Roch* and the *S.S. Master.*

Dr. Pijush Kundu attended the annual spring meeting of the American Geophysical Union (AGU), which was held May 29 - June 1 in Baltimore. He presented a poster entitled "Evidence of Critical Richardson Number off the Coast of California," co-authored by **Dr. Robert Beardsley**, of Woods Hole Oceanographic Institution.

Dr. Charles Messing spent the week of April 30 - May 4 in Washington, DC, where he visited the Smithsonian Museum. Most of his time was devoted to examining specimens of deep-sea feather stars (Crinoidea) and talking with the exhibit staff about ideas for Fort Lauderdale's proposed new Discovery Center. He managed to find time to "peddle" some research ideas at the National Science Foundation, as well as to discuss the proposed oceanographic educational video series "Deep Frontier" with the director of the Informed Science Education Program.



Over the weekend of May 11-13, **Dr. Messing**, along with **Dr. Donald Smith** of Nova College, attended a gathering called "Saturday at the Sea," held on the Gulf Coast near Apalachicola. Sponsored by the Florida State University Marine Lab, the object was to show junior high and high school students the coastal sights. They dredged in the grass flats from boats, brought "critters" back from the salt marshes, and learned more about the marine environment - the food web, predation, camouflage. The object was to try to interest other universities in the state in this type of program. Dr. Messing would like to extend the idea as an Outreach Program to Broward County.

Dr. Julian McCreary will attend an international meeting of the CCCO Indian Ocean Panel in Honolulu on July 10-11, followed by a joint meeting with the Pacific Ocean Panel July 12-13. During the following week, July 16-20, he will attend the International TOGA (Tropical Ocean Global Atmosphere) Scientific Conference, also in Honolulu, and will present a paper entitled "A Numerical Investigation of Equatorial Ocean Circulation." **Zuojun Yu,** one of Dr. McCreary's Ph.D. students, will attend the TOGA meeting as well.

Jan Witte also will travel to Honolulu to attend the International TOGA Scientific Conference. She will present a poster advertising a new oceanographic bulletin, *TOGA Notes,* which she will co-edit with **Dr. Julian McCreary** for the next 5 years, starting this fall.

Visiting Speakers

Several seminars were presented by visiting speakers during the spring months. They included:

Dr. William Jaeckle, of Harbor Branch Oceanographic Institution: "The Role of Dissolved Organic Material in Seawater for the Growth and Energetics of the "Non-feeding" Larvae of *Haliotis Rufescens* (Gastropoda)" (March 9).

Dr. Peter Ortner, of NOAA/AOML, Miami: "Mesoscale Variability of Physically and Biologically Coupled Systems in the Alaska Coastal Current" (March 16).

Prof. Bao Zhen Zhu, of the Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing: "Dynamical Effect of Large-scale Orography on the Tropical Climate" (March 22).

Dr. Alan Bratkovich, of NOAA/ERL in Ann Arbor, Michigan: "Evolution of Buoyant Plumes in Shallow Coastal Waters" (May 11).

Broward County Renews Sea Turtle Contract

Cathy Mattison and **Dr. Curtis Burney** have begun another season of evaluating sea turtle nests, relocating the endangered ones, and overseeing the release of hatchlings. Broward County has awarded the 1990 contract to the Center once again, to the tune of $44,839.

Our team is responsible for all sea turtle nests from the Broward-Palm Beach County line south to the Dade County line (excluding Lloyd Beach State Park). The laying season began in mid-April, and the release period will begin in late June.

If anyone is interested in volunteering time and TLC, please call Cathy at the **Turtle Hotline: (305) 925-7496**. She may need helpers to relocate eggs at the hatcheries, between 7:30 and 9:00 AM. During the release period, which can last into September, she could use helpers on the night shift, between 9:00 PM and 5:00 AM. Sorry, but that's when the turtles like to hatch out.

UNDERCURRENTS
INSTITUTE OF MARINE AND COASTAL STUDIES

Sea Pollution Sources Under Study

M.S. student **Isabel Puente** has been studying the coliphage content of warm-blooded animal feces for nearly three years (see *Currents,* Fall 1987). She has used fecal samples taken from seagulls, sea lions, dolphins, pelicans, and one cormorant, as well as from humans.

It is known that the intestines of warm-blooded animals, including humans, contain "very normal" bacteria, *E. coli*. It is also known that certain bacterial viruses, called coliphages, will attack *E. coli,* making hosts of the bacteria. Using a unique method developed by **Dr. Donald McCorquodale**, of Spectrum Laboratories in Fort Lauderdale, Isabel has been trying to learn whether coliphages of nonhuman origin could be found naturally in sea water.

"There are many strains of *E. coli*," Isabel explains. "There are also many different types of coliphage, and they are very specific to the varieties of *E. coli* host that they choose to attack. Coliphages have been proposed as indicators of fecal pollution, or raw sewage pollution, for years. One reason is that they survive longer in seawater than other microorganism indicators of pollution.

"Dr. McCorquodale's method is very fast, easy to perform, and less expensive than other methods of determining standard indicators. The literature offers a variety of methods to enumerate coliphages. Yet not one of them has been approved as a standard. The focus of my study is to find out whether our method will detect coliphages from nonhuman origins."

At the start of Isabel's experiment, a problem sample is mixed with a culture of a specific strain of *E. coli* and the nutrients needed to feed the bacteria; then the sample is incubated. She finds that "the culture of *E. coli* will grow everywhere on the nutrients - like a lawn - except in those places where the coliphage specific for the bacteria kills them. So I look for clear areas on the 'lawn,' which means that the bacteria were not growing there because the coliphage has killed them."

Isabel Puente working with samples

Using a hypothetical case, Isabel explains how coliphages of nonhuman origin could interfere with the coliphage method. "Let's say that a technician has taken a water sample in a beach area, and after analysis he finds a high density of coliphage. Let us also suppose that just before the sample was taken, a flock of seagulls, carrying coliphages in their intestines, were feeding around the technician and probably defecating as well. Was the high density of coliphage in the sample an indication of a broken sewage pipe spilling its contents onto the beach, or was it a consequence of a flock of birds doing the natural thing in their natural habitat?

"I have researched sea animals that potentially can carry coliphages and have detected coliphage in seagull and cormorant fecal material. I found coliphage in only one out of three pelican fecal samples, and none in sea lion and dolphin samples." Of the 16 human fecal samples analyzed, Isabel came up with a very interesting result: "I found very little coliphage, or none at all, in the human samples. That's a surprise. I was expecting coliphage to be present in human feces. After the first findings, I saw the same problem in the literature: coliphage is always detected in raw sewage but is very difficult to find in human feces.

"There is an ongoing debate as to whether coliphage is an indicator of human fecal pollution or raw sewage pollution. I designed an experiment whereby fresh human feces were diluted in buffered water and kept at room temperature in the dark - a condition similar to raw sewage on the way to a treatment plant - and I analyzed the samples at periodic intervals. On the first day, when the samples were still fresh, none of the 7 human fecal samples had detectable levels of coliphage. After several days, 3 samples did contain coliphage at some point.

"Then other questions arose. Coliphage seems to be present in a very low percentage of fresh human feces, but once the fecal material is diluted and aged outside the human body, why does that coliphage show up? What are the mechanisms that make coliphage undetectable in fresh human feces? Can we really say that coliphage is an indicator of human fecal pollution? On the other hand, it seems that nonhuman animals can be natural sources of coliphage in the marine environment and not be considered polluters.

"A naive question is the starting point of my thesis ("Sources of Coliphage in the Marine Environment"): Is our technique specific for the detection of strictly human fecal pollution sources in the marine environment? This question has evolved into many others that will need to be further investigated."

Isabel plans to complete her thesis this summer, and new investigations will have to wait until later. A native of Spain, she plans to look for a job as a technician in the U.S. after graduation. Maybe, just maybe, she will go on for her Ph.D. in marine biology and encounter some old familiar pollution problems still waiting to be resolved.

SUMMER TERM SCHEDULE SET

Master's degree specialties at the Institute of Marine and Coastal Studies in Dania are **Marine Biology** and **Coastal Zone Management**. Many courses may be of interest to teachers for recertification. Each class is for 3 credits; all can be audited. Tuition is $225/credit hour (50% less for audit). Classes meet once each week from 6:30 to 9:30 PM, July 2 through September 14. Call (305)920-1909 for further information.

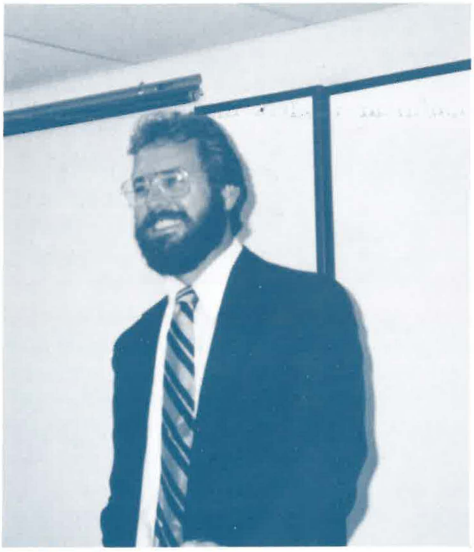
AQUACULTURE (OCMB-6200): A survey of the field of aquaculture. Provides practical, hands-on training in the latest methods of commercial shrimp, fish, and other animal culture. Includes work with live animals, hatchery design and management, culture of larval foods, larval culture techniques, stocking and growout, disease and problems, sourcing of breeders, maturation, and marketing and finance. Species studied include catfish, tilapia, shrimp, and clams. Several Sunday field trips are planned. Instructor: **Dr. Bart Baca**, Center Adjunct. (Begins Thurs., July 5.)

COASTAL WATER RESOURCE IMPACTS (CZMT-0622): Emphasizes development impacts on coastal water resources. Topics include residential, commercial, and industrial development; power plant siting and development; airport development and expansion; solid waste, wastewater, and hazardous waste disposal facilities; flood protection; port and marina development; and wetlands loss. Includes lectures by state and federal experts in the field. Instructor: **Mr. Stacy Myers**, Center Adjunct. (Begins Mon., July 2.)

MARINE CHEMISTRY (OCOR-5603): A core course for both specialties. Reviews the properties and composition of seawater; the importance, distribution, relationships and cycling of major nutrients; dissolved gasses; trace metals; and organic compounds. Includes self-paced laboratory activities and interactive microcomputer work. Instructor: **Dr. Curtis Burney**, Center Faculty. (Begins on Fri., July 6, but will be held on Wed. thereafter.)

Denis Frazel Defends Thesis, Earns Ph.D.

We may now call him **Dr. Frazel**. Denis successfully defended his Ph.D. thesis on May 11. His thesis title is "Aspects of Phytoplankton, Chlorophyll *a*, Carbon-specific Growth Rates, and the Distribution of Chlorophyll *a* and Primary Productivity in Relation to the Water Column Structure of the Eastern North Atlantic Ocean." The first hurdle was remembering the title.



Dr. Denis Frazel, at his defense

Denis's major professor was **Dr. Gary Hitchcock**, now with the University of Miami. The primary focus of his work was to evaluate the chlorophyll *a* labeling technique for the determination of chlorophyll *a* carbon-specific growth rates. He explains that "I was interested in evaluating the short-term kinetics of the labeling time of natural phytoplankton populations in different oceanic regions, as a function of both environmental condition and latitude. The distributions of chlorophyll *a* and primary productivity have been described in relation to the water column structure over a latitudinal transect extending from Iceland (60°N) to 7°N. The research was performed during the 1988 NOAA Global Change Expedition."

Denis has accepted a position as a postdoctoral research associate at the University of Miami's Rosenstiel School (RSMAS) and will work under the supervision of **Dr. Peter Ortner**. "I will be working on a project investigating the Gulf Stream front and its role in larval fish survival and recruitment in Florida," he explains. Principal investigators for the two-year study are Miami's **Dr. Elizabeth Clark** and Nova's **Dr. Gary Kleppel.**

Denis began his graduate studies on Florida lobsters under **Dr. Robert Menzies** and received his M.S. from Nova in Marine Biology. He is most grateful to "Dr. Menzies, who gave me the opportunity to prove myself in graduate school, and to Dr. Gary Hitchcock, who acted as my mentor and major professor for six long years and provided me with a world-class oceanographic education."

Learning at all Levels

Robert Miller, a B.S. student in the fledgling Nova College/Oceanographic Center undergraduate program in Ocean Studies, has jumped a major barrier. On top of taking a full course load at Nova's main campus, he has dug into his second consecutive M.S.-level course at the Center.

Last term, Miller took **Dr. Charles Messing's** Marine Invertebrate course. Now he is enrolled in the Tropical Fish Ecology course, taught by **Dr. Dennis Landmeier**. Despite his multiple-course diet, he manages to spend quite a bit of time hunched over Dr. Messing's microscope, sifting through sediment samples in search of organisms. His task is to separate them into basic phyla as part of the Broward County Beach Renourishment Project. The specimens, taken from offshore areas between the affected coral reefs, are then sent off to other institutions for positive identification (see *Currents*, Summer 1989).

We are certain to hear more of Mr. Miller's academic exploits in future issues of *Currents*.

Continued on page 7.

Carol, Reese, at her defense

Carol Reese Defends M.S. Thesis

On May 11, **Carol Reese** successfully defended her M.S. thesis, entitled "Pigments as Indicators of a Response to Environmentally Induced Modification of a Coral-algal Symbiosis." Her major professor was **Dr. Gary Kleppel**; others on her committee were **Dr. Richard Dodge** of Nova and **Dr. Alina Szmant**, of the University of Miami.

Carol's research has been well documented in past issues of *Currents* (see Winter 1988 and Summer 1989). Overall, she feels that "this direction of research may offer some insight into coral nutrition and open many doors for further research on the topic." At present she is working on two scientific papers that will be submitted to *Limnology and Oceanography Notes* and to *Marine Biology*.

We will not lose Carol even though her thesis work has been completed. She will continue to work at the lab on a Naval Surface Warfare Center contract, for which she maintains a flowing seawater system and sensors for pH, conductivity, temperature, dissolved oxygen, and air sulphur dioxide for corrosion studies. As for plans beyond this study, Carol is weighing various job options in South Florida and in California, as well as the possibilitiy of pursuing a Ph.D. in Biological Oceanography this fall.

Hyong Lee Defends Ph.D. Thesis

Dr. **Hyong Lee**, who has studied under **Dr. Julian McCreary** for the past five years, successfully defended his thesis on June 1. His thesis title is "The Coastal Ocean Response to Strong Offshore Winds in the Gulfs of Tehuantepec and Papagayo."

The thrust of his research has been to investigate the response of the coastal ocean to strong offshore winds, and he has used four different ocean models in the process: a linear and a nonlinear 12-layer model, and a linear and a nonlinear 22-layer model. The nonlinear models include thermodynamics and entrainment. They are forced by wind stress fields similar in structure to the intense wintertime mountain pass jets that appear in the Gulfs of Tehuantepec and Papagayo in Central America.

According to Lee, "the coastal sea level drop is enhanced by several factors: horizontal mixing, advection of the upper-layer thickness field, enhanced forcing, coastal geometry, and the existence of a second active layer in the 22-layer model.When all of these factors are included, the resulting maximum drop is -30.0 cm -- close to observed values. Solutions to the 22-layer model indicate that the lower-layer flow field advects the gyres westward significantly, being 12.8 km/day - again, close to observed values."

Hyong Lee, awaiting his defense

Lee plans to return to his homeland, South Korea, and the Korean Naval Academy, where he worked prior to coming to the U.S. He leaves us with good thoughts about our lab. "I hope this lab will progress in the future and I wish I could help it do so. I've had a hard time here, but I've enjoyed it. I feel that it's a family research center, and that I'm part of the family. I strongly feel that with the guidance from **Jay [McCreary]**, and from **Kevin [Kohler]**, I am who I am. I could have been nothing, and I'll never forget them - for all my life."

Continued from page 6

Learning at all Levels

Robert Miller with friends under study

Braker Receives Award

M.S. student **John Braker** has been awarded a Collaboratorship by the Brookhaven National Laboratories, in Upton, NY, for the summer of 1990. He will work with **Drs. Sharon Smith** and **Charles Flagg** on an Acoustic Doppler Current Profiler (ADCP) project, which just happens to coincide with his thesis subject.

Meanwhile, John is working with his major professor, **Dr. Gary Kleppel**, on a Port Everglades Management project. His duties involve keeping long-term data records of temperature, conductivity, and chlorophyll content of Port waters as part of an assessment of contaminant transport.

Currents, Spring 1990

Oceanographic Center
8000 North Ocean Drive
Dania, Florida 33004

Onque Honored

Craig Onque, hard at work at his desk

M.S. student **Craig Onque** has been selected as one of seven of this year's recipients of the Joint Nova University and Gulfstream Park Scholarship. He was the only winner from the Oceanographic Center. Craig attests that "it was quite an honor, and the monies will be very useful in paying for my last semester as a graduate student at Nova. I will be the first student to finish with the joint M.S. speciality option: Marine Biology and Coastal Zone Management. Currently I am finishing my nonthesis option and getting ready to defend."

After receiving his M.S. degree at Nova, Craig will pursue another master's degree in Science Education at the University of Pittsburgh, starting this fall. Concurrently, he will be student teaching at community colleges in that area. "I foresee a Ph.D.in education somewhere in the future," he adds, "followed by a career in undergraduate and graduate instruction. My years at Nova have been exciting and rewarding, but it is time to move on and begin the rest of my life."

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